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EXAMINER

NEGRON, DANIEL L

ART UNIT PAPER NUMBER

2651

DATE MAILED: 02/17/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/954,997

Applicant(s)

LIIKANEN ET AL.

Examiner

Daniell L. Negrón

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 September 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-59 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-59 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 September 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>6</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement (IDS) submitted on November 24, 2003 was filed after the mailing date of the current application on September 17, 2001. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Drawings***

2. The drawings are objected to because drawings submitted on September 17, 2001 are informal. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-6, 36, 40-44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

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Regarding claims 1, 6, 36, 40, and 41, the recitation "...skew angle is zero degrees when said read element and said write element are located off of said data storage region..." is not supported by specification.

Regarding claims 2-5 and 42-44, claims 2-5 and 42-44 are dependent on independent claims 1 and 41 respectively and are therefore rejected for the reasons discussed above.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-13, 15-22, 24-35, and 36-45 are rejected under 35 U.S.C. 102(b) as being anticipated by Cunningham U.S. Patent No. 4,945,427.

Regarding claim 1, Cunningham discloses a disk drive comprising a magnetic disk having a data storage region (Fig. 1, 12) and an actuator arm assembly (Fig. 1, 14) and a read element and a write element (Fig. 1, 16) wherein the actuator arm assembly (Fig. 1, 14) rotates about a second end (Fig. 1, 10) of the actuator arm.

Cunningham also discloses a disk drive wherein at least one of the read element skew angle and the write element skew angle is zero degrees (column 7, lines 20-27).

Regarding claim 2, Cunningham discloses a disk drive wherein the data storage region (12) includes a plurality of concentric tracks (see Fig. 1) which include sectors including data

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sectors and servo sectors and wherein the servo sectors are written in a non-radially coherent manner (column 4, lines 41-46 and column 5, lines 3-10).

Regarding claim 3, Cunningham discloses a disk drive wherein the data storage region includes a plurality of concentric tracks wherein servo sectors are printed on the magnetic disk surface prior to assembly into the disk drive (column 4, lines 41-63).

Regarding claim 4, Cunningham discloses a disk drive wherein the head is mounted such that at least one of the read element and the write element is not perpendicular to a centerline of the flexure arm (see Fig. 2, elements 14 and 16).

Regarding claims 5 and 6, claims 5 and 6 have limitations similar to those treated in the above rejection of claim 1, and are met by the reference as discussed above.

Regarding claim 7, Cunningham discloses a disk drive comprising a magnetic disk having a data storage region (Fig. 1, 12) and an actuator arm assembly (Fig. 1, 14) and a read element and a write element (Fig. 1, 16) having skew angles, wherein the actuator arm assembly (Fig. 1, 14) rotates about a second end (Fig. 1, 10) of the actuator arm.

Cunningham also discloses a disk drive wherein at least one of the read element and the write element is mounted to a flexure arm such that a skew angle of at least one of the read element and the write element relative to the data storage region is greater than 30 degrees for the entire data storage region (column 7, lines 13-19).

Regarding claim 8, claim 8 has limitations similar to those treated in the above rejection, and are met by the reference as discussed above, wherein Cunningham further discloses that the skew angle is 45 degrees.

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Regarding claim 9, Cunningham discloses a disk drive wherein at least one of the read element and the write element is mounted such that a skew angle of at least one of the read element and the write element relative to the data storage region is greater than 60 degrees for the entire data storage region (column 5, line 67 through column 6, line 9).

Regarding claim 10, Cunningham discloses a disk drive wherein the data storage region (12) includes a plurality of concentric tracks (see Fig. 1) which include sectors including data sectors and servo sectors and wherein the servo sectors are written in a non-radially coherent manner (column 4, lines 41-46 and column 5, lines 3-10).

Regarding claim 11, Cunningham discloses a disk drive wherein the data storage region includes a plurality of concentric tracks wherein servo sectors are printed on the magnetic disk surface prior to assembly into the disk drive (column 4, lines 41-63).

Regarding claims 12, 13, 15, and 16, Cunningham discloses a disk drive wherein the data storage region (12) includes a plurality of concentric data tracks each having a width associated therewith (column 3, lines 3-14).

Furthermore, the reference is considered to meet the limitations since the angle between the data track and read or write head forms a right triangle. A well-known trigonometric identity teaches that the cosine of the opposite angle (i.e. skew angle) equals the quotient of the adjacent side (i.e. data track width) divided by the hypotenuse (i.e. write head width). Therefore, since the widths of the tracks and heads correspond to the sides of a right triangle, the identity discussed above can be manipulated in order to discover the correspondence of any value to the cosine as well as the inverse cosine of the skew angle.

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Regarding claims 17-21 and 26-31, claims 17-21 and 26-31 have limitations similar to those treated in the above rejections of claims 7-11 respectively, and are met by the reference as discussed above.

Regarding claims 22, 24, and 25, claims 22, 24, and 25 have limitations similar to those treated in the above rejections of claims 12, 13, and 15 respectively, and are met by the reference as discussed above.

Regarding claim 32, claim 32 has limitations similar to those treated in the above rejection of claim 7, and are met by the references as discussed above. Claim 32 however also recites the following limitations:

A disk drive wherein the width of at least one of the write element and the read element is greater than the track width for each of the plurality of concentric data tracks as Cunningham discloses on column 5, lines 51-58.

Regarding claims 33 and 34, claims 33 and 34 have limitations similar to those treated in the above rejections of claims 10 and 11 respectively, and are met by the references as discussed above.

Regarding claim 35, Cunningham discloses a disk drive wherein the head is mounted such that at least one of the read element and the write element is not perpendicular to a centerline of the flexure arm (see Fig. 2, elements 14 and 16).

Regarding claim 36, claim 36 has limitations similar to those treated in the above rejection of claim 1, and are met by the reference as discussed above.

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Regarding claims 37-39, claims 37-39 have limitations similar to those treated in the above rejections of claims 7-9 respectively, and are met by the references as discussed above.

Regarding claims 40 and 41, claims 40 and 41 have limitations similar to those treated in the above rejection of claim 1, and are met by the reference as discussed above.

Regarding claims 42-44, claims 42-44 have limitations similar to those treated in the above rejections of claims 7-9 respectively, and are met by the references as discussed above.

Regarding claim 45, method claim 45 is drawn to the method of using the corresponding apparatus claimed in claims 7 and 12. Therefore method claim 45 corresponds to apparatus claims 7 and 12 and is rejected for the same reasons of anticipation as used above.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 14 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cunningham U.S. Patent No. 4,945,427 in view of Nepela et al U.S. Patent No. 5,793,550.

Regarding claim 14, Cunningham discloses a disk drive with all the limitations of claim 7 as discussed above, but fails to show a signal-to-noise ratio produced by the read element being at least 6 dB.



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However, Nepela et al discloses a read head wherein the output current applied is optimize for the purpose of improving the signal to noise ratio (column 3, lines 56-65).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the disk drive as disclosed by Cunningham with the read head current optimization as taught by Nepela et al in order to increase the signal-to-noise ratio of the signal read by the magnetic head and hence to improve the quality of the output signals.

Regarding claim 23, claim 23 has limitations similar to those treated in the above rejection of claim 14, and are met by the references as discussed above.

9. Claims 46-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cunningham U.S. Patent No. 4,945,427 in view of Cunningham et al U.S. Patent No. 5,790,341.

Regarding claims 46-48, Cunningham '427 discloses a method with all the limitations of claim 45 as discussed above, but fails to show a skewing step further including selecting the slew angle such that the width tolerance is increased by at least 30 per cent.

However, Cunningham et al '341 discloses a method of changing the effective widths of the heads and thereby modifying the tolerance by skewing the head in a disk drive for the purpose of increasing the amplitude of the read signal for the purpose of improving the performance of the head (column 7, line 36 through column 8, line 7).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the method disclosed by Cunningham '427 with the method of skewing the head as taught by Cunningham et al '341 in order to reduce interference in a read head and further to increase the amplitude of the read signal. Furthermore the percentage of the

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tolerance increase is considered merely readjusting the elements and no unexpected result is to occur.

Regarding claims 49-59, claims 49-59 have limitations similar to those treated in the above rejections of claims 46-48 respectively, and are met by the references as discussed above.

### ***Prior Art***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Mallary et al U.S. Patent No. 5,724,212 cited as of interest for disclosure of formulas regarding skew angle.

Hanrahan et al U.S. Patent No. 4,796,558 cited as of interest for disclosure of configuration of actuator assembly.

Cunningham et al U.S. Patent No. 6,002,540 cited as of interest for disclosure of formulas regarding skew angle.


### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniell L. Negrón whose telephone number is 703-305-6985. The examiner can normally be reached on Monday-Friday (8:30-6:00) Alternate Fridays off.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Hudspeth can be reached on 703-308-4825. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DLN   
February 3, 2004

  
DAVID HUDSPETH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600